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COMPLETE SPECIFICATION.

Improvements in Dental Cements.

I, Albert Paul Tschirner, a Citizen of the United States, residing at No. 507, North Spring Avenue, in the City of St. Louis, State of Missouri, United States of America, Dentist, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement;—

It is well known that zinc phosphate dental cements contain more or less glycerine, which is added for the purpose of obtaining a plastic, workable mass, and to lessen the quick action of the phosphoric acid on the oxide of zinc. As these glycerine compounds are very unstable, being unable to withstand the action of the saliva, it has been desirable to obtain a filling material avoiding the use of glycerine or any soluble, foreign substance which would deteriorate or waste away in the mouth.

It is the object of my present invention to produce an insoluble, phosphate of zinc cement, in which no glycerine or any other soluble substance is used. My invention consists in a liquid compound, the base of which is an acid phosphate of zinc, combined with a powder consisting mainly of oxide of zinc, with other basic oxides added in various proportions, for the purpose of adapting my cement to the various operations required in dentistry.

In carrying out my invention, I have found the following formulas to answer admirably, but it is obvious that the proportions given can be changed, and the ingredients also changed, without, in the least, departing from the nature and principle of my invention; In a fluid ounce of phosphoric acid, having approximately a specific gravity of 1.69, I dissolve 160 grains of oxide of zinc, and then add two drams of aqua ammonia, after which the liquid is evaporated to a density of about 1.945. The powder to be used in conjunction with the above liquid is composed of four parts of oxide of zinc, six parts oxide of tin, and two parts oxide of aluminium.

To use the cement, a desired quantity of powder is made plastic by the liquid compound, as is well understood.

Another illustration of my invention is as follows; In a fluid ounce of phosphoric acid, specific gravity 1.69, I dissolve 120 grains of oxide of zinc, and forty grains of oxide of aluminium. The powder to be used in conjunction with this compound is composed of four grains of oxide of zinc and six grains of oxide of tin. In the last mentioned formula, the aluminium is introduced into the liquid compound instead of the powder as stated in the first illustration. In both illustrations it will be noticed that the cement is formed of insoluble basic phosphates, free of any substance soluble in water, such as glycerine, gelatin, or other similar substances.

It will be noticed that in the above two formulas, both contain liquid and powder constituents. The liquid constituents of the first formula are composed of phosphoric acid and oxide of zinc, the ammonia being introduced to form a union between the two and prevent hardening of the zinc, so that the phos-

[*Price 8d.*]

phates of zinc will remain liquid for a long time. The powder constituent in this first mentioned formula containing the oxides of zinc, tin and aluminium, is thoroughly mixed before the liquid is added to it, and after the addition of the liquid, the basic phosphates are formed, and, being of the proper proportion, will harden slowly, giving the operator ample time to manipulate it before the hardening process is completed. In the last mentioned formula the liquid constituents contain the oxide of aluminium in addition to the other ingredients, and the powder constituent, the oxides of zinc and tin. In this formula the aluminium is merely transferred from the powder to the liquid constituent, the proportion of the parts being substantially the same.

In the preparation of the powder constituent and after it is mixed I take a small quantity of shellac and dissolve it in alcohol, of such quantity so that when the shellac solution is mixed with the powder constituent, it makes a sort of dry paste, which is then permitted to dry out, with the result that the little particles of powder are enclosed in the coating of shellac. The object and purpose of this is to render the oxides impervious to the atmosphere. Were the oxides exposed, they would absorb carbonic acid gas, and the powder constituent would deteriorate before it was used.

My cement has the following advantages: It is a perfect chemical compound composed solely of insoluble basic phosphates, free of any substances which are soluble in water; permanently insoluble; has a high degree of density and hardness; is a non-conductor of heat, and, therefore, avoids irritation of the dental nerve; and is readily adaptable to the tooth cavity, thereby insuring the exclusion of moisture and bacteria.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. The herein described dental cement composed of liquid and powder constituents, said constituents being made of phosphoric acid, ammonia, and metallic oxides, such as zinc, tin, and aluminium; substantially as described.

2. A slow hardening cement free from substances soluble in water, the same consisting, when hardened, of insoluble phosphates of zinc, tin, and aluminium; substantially as described.

Dated the 31st day of October 1899.

PHILIP M. JUSTICE,
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